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VOYAGER SATURN ENCOUNTER

The observatory phase of the Voyager 1 encounter at Saturn began August 22 and ran through October 24, 1980. The two-month period produced many spectacular pictures of the planet, its rings and moons before the November 11-13 near-encounter phase.

The historic picture (opposite page) of ringed Saturn and six of its moons was taken by Voyager 1 on September 17 from a distance of 76 million kilometers (47 million miles). The quality and resolution of the image are far superior to the best Earth-based photographs.

Saturn's largest moon, Titan, is the reddish disk visible at the mid-upper right. This satellite, almost twice the diameter of Earth's moon and known to have a significant atmosphere, was targeted for close scrutiny by Voyager 1 on November 12, 18 hours before closest Saturn approach. The spacecraft was to fly within 4000 km of Titan's cloud tops and proceed behind the satellite for experiments which analyze sunlight and radio waves passing through the atmosphere.

Five of Saturn's other inner satellites are also shown. Mimas, closest to Saturn, and Enceladus are located just below Saturn's outer ring (right center). Rhea, Tethys, and Dione (left to right) are seen in the upper left corner. During a 2-1/2-hour period on November 13, Voyager 1 was scheduled to pass close to Mimas, Dione, and Rhea (89,000, 161,000, and 73,000 km, respectively).

To capitalize on the particularly close Rhea flyby, extraordinary efforts were planned to reduce the image smear that would normally occur during photography at high velocity so far from the sun. During part of the flyby the spacecraft was to be maneuvered at a rate and in a direction chosen to compensate for Rhea's motion.

Enceladus and Tethys will be best photographed by Voyager 2 when it flies through the Saturn system in August 1981.

Also shown in this photograph is significant detail in Saturn's rings including the Encke (outer) and Cassini (inner) Divisions. Radial variations and gaps never observed before are pictured, including at least two narrow rings of material within the Cassini Division. Also revealed in the Voyager data are dark features which extend radially out through the rings. Such circumferential asymmetries are inconsistent with previous theoretical models of the rings.

During the approach, Voyager images disclosed many discrete features in Saturn's atmosphere, which permitted the measurement of wind velocities at many latitudes.

The early Voyager observations indicate clearly that, despite many fundamental similarities between Jupiter and Saturn, the latter planetary system has many characteristics which, so far, appear unique in the Solar System.